



Subject card

Subject name and code	Energy audit, PG_00055936								
Field of study	Power Engineering, Power Engineering, Power Engineering								
Date of commencement of studies	October 2021	Academic year of realisation of subject		2023/2024					
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study				
Mode of study	Full-time studies		Mode of delivery		at the university				
Year of study	3	Language of instruction		Polish					
Semester of study	5	ECTS credits		2.0					
Learning profile	general academic profile		Assessment form		assessment				
Conducting unit	Zakład Systemów i Urządzeń Energetyki Cieplnej -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology								
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Barański						
	Teachers		dr hab. inż. Jacek Barański						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM		
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30		
E-learning hours included: 0.0									
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM		
	Number of study hours	30		2.0		18.0	50		
Subject objectives	The aim of the course is to learn the principles of energy audits of buildings and industrial facilities.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K6_W11] has knowledge of known technologies and non-technical aspects to solve simple engineering tasks in the field of energy systems and devices		The student has knowledge of the known technologies and non-technical aspects to solve simple engineering tasks in the field of power systems and devices.			[SW1] Assessment of factual knowledge			
	[K6_U05] is able to formulate and carry out energy balances in devices and energy systems, also perform an energy audit of a simple building object, is able to perform a preliminary profitability analysis of a planned energy investment		The student is able to perform an energy audit of a simple building, is able to perform a preliminary analysis of the profitability of the planned energy investment.			[SU4] Assessment of ability to use methods and tools			
	[K6_W06] knows classic and developmental energy technologies, rules for the selection and operation of heat and energy devices and installations, basic principles of energy systems operation, basic issues regarding the reliability of energy devices and diagnostics, environmental effects of energy technologies used, methods of using renewable energy sources		The student knows the basic principles of the operation of energy systems, the environmental effects of the energy technologies used, the ways of using renewable energy sources.			[SW1] Assessment of factual knowledge			
	[K6_K04] is able to formulate opinions on technical and technological processes in energy and sanitary engineering		The student is able to formulate opinions on technical and technological processes in power engineering and sanitary engineering.			[SK5] Assessment of ability to solve problems that arise in practice			

Subject contents	<p>Lecture:</p> <p>Energy standards of buildings. Thermal comfort. Calculations of heat losses and gains. Energy demand. Energy needs of buildings (heating, hot water preparation, ventilation and lighting). Principles of performing energy audits of buildings.</p> <p>Laboratory: Calculation of heat demand for a building using Audytor OZC software. Formulating thermomodernization projects and determining optimal thermomodernization improvements.</p>									
Prerequisites and co-requisites	<p>Basic knowledge of technical drawing, mathematical calculations, basics of heat transfer processes. Student can obtain information from literature, databases and other properly selected sources; also in English in the field of energy, is able to integrate the information obtained from many fields, interpret and critically evaluate it, as well as draw conclusions and formulate and exhaustively justify opinions. He is ready to critically assess and analyze issues and recognizes the importance of knowledge in solving cognitive and practical problems in the field of energy.</p>									
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="446 765 794 799">Subject passing criteria</th><th data-bbox="794 765 1144 799">Passing threshold</th><th data-bbox="1144 765 1486 799">Percentage of the final grade</th></tr> </thead> <tbody> <tr> <td data-bbox="446 799 794 833">laboratory report</td><td data-bbox="794 799 1144 833">56.0%</td><td data-bbox="1144 799 1486 833">20.0%</td></tr> <tr> <td data-bbox="446 833 794 878">written test</td><td data-bbox="794 833 1144 878">56.0%</td><td data-bbox="1144 833 1486 878">80.0%</td></tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory report	56.0%	20.0%	written test	56.0%	80.0%
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laboratory report	56.0%	20.0%								
written test	56.0%	80.0%								
Recommended reading	<p>Basic literature</p> <p>1. Aktualne przepisy prawne obowiązujące w zakresie sporządzania audytu energetycznego oraz świadectw charakterystyki energetycznej budynków (ustawy, rozporządzenia)</p> <p>2. Ogrzewnictwo praktyczne, Halina Koczyk, Bronisława Antoniewicz i inni Systherm 2014</p> <p>3. Dydenko J.: Charakterystyka energetyczna i audyt budynków przepisy z wprowadzeniem. Wydawca: Wolters Kluwer 2009</p> <p>4. Górzynski J.: Podstawy analizy energetycznej obiektów budowlanych. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2012</p> <p>5. Kurtyn K., Gawin D.: Certyfikacja energetyczna budynków mieszkalnych z przykładami. Wydawnictwo: Wrocławskie Wyd. ALTA2</p> <p>6. Laskowski L.: Ochrona cieplna i charakterystyka energetyczna budynków. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005</p> <p>7. Lejdy B.: Instalacje elektryczne w obiektach budowlanych. Wydawnictwa Naukowo Techniczne</p> <p>8. Mizielińska K., Olszak J.: Gazowe i olejowe źródła ciepła małej mocy. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005</p> <p>9. Ulbrich R.: Audit energetyczny a dom energooszczędny. Oficyna Wydawnicza Politechniki Opolskiej. Opole 2000</p> <p>Supplementary literature</p> <p>1. Halina Koczyk , Bronisława Antoniewicz: Nowoczesne wyposażenie techniczne domu jednorodzinnego Instalacje sanitarne i grzewcze</p> <p>2. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie.</p>									

	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Definition of an energy audit.</p> <p>Types of energy audits and methods of conducting them.</p> <p>Ways to reduce heat demand in residential and industrial buildings.</p>	
Work placement	Not applicable	